

# CLEANSPACE

Small debris removal by laser illumination and complementary technology

## TIME FOR A CLEAN UP IN SPACE

A screw, a glove, a piece of an antenna broken off from an old satellite. Thousands of small sized pieces of space waste orbit Earth. Such debris is hazardous for satellites. The CLEANSPACE project anticipates using laser technology to do a proper clean up.

Only a few hundred kilometres above us, the population of small sized space debris is increasing. The trend is for more and smaller pieces of space junk as existing pieces collide, leading the increase to become exponential. The vast majority of such space debris is between 1 and 10 centimetres.

In order to address the proliferation of space waste, and protect Europe's space infrastructure, such as future Galileo and GMES satellites, the development of effective space debris removal technologies is paramount.

The CLEANSPACE project addresses this challenge, and proposes to develop a concept which would allow for the safe removal of small sized space waste – between 1

and 10 centimetres – by means of powerful laser pulses. A system of ground-based laser stations would create a very small thrust on space debris by ablating its surface. Ultimately, the impact of such lasers would modify the velocity of the junk, which would lead it into a lower orbit. Hence, the concept would allow both for changing the course of a piece of debris, thereby avoiding a predicted collision with valuable space infrastructure, and ultimately the removal of the waste as its new course takes on a course to atmospheric re-entry.

Further to developing the concept for such a system, CLEANSPACE will also tackle safety regulation aspects of its development. The insights gained in this project will allow Europe to be a key actor for laser debris removal that could contribute constructively to the development of future global rules and regulations governing the safe removal of space waste.



**CHRISTOPHE JACQUELARD**  
IS PROJECT COORDINATOR



Space Junk © Paul Fleet - Fotolia.com

**CLEANSPACE will develop a concept allowing for removal of small-sized space waste.**

## QUESTIONS & ANSWERS

### What do you want to achieve with this project?

I want to define an affordable architecture (including surveillance, identification and tracking) for an innovative ground-based laser solution which can remove hazardous medium debris around selected space assets to protect European satellites and launchers.

### Why is this project important for Europe?

Because securing long term space commercial activity is essential for Europe. It will also allow Europe to be a key actor for laser debris removal system able to discuss the subject with the USA and Russia, and able to guide future ESA work and regulations.

### How does your work benefit European citizens?

By its dissemination strategy and its demonstration day, the CLEANSPACE study will provide to European citizens a better view on laser propulsion and momentum coupling to debris objects, and will allow the development of a European capacity to protect space assets from space debris.

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## LIST OF PARTNERS

- CILAS, Compagnie Industrielle des Lasers, France
- Deutsches Zentrum für Luft- und Raumfahrt, DLR, Germany
- Astrium – Space Transportation, France
- Rovira i Virgili University, Spain
- Laboratoire de Physico-Chimie des Matériaux Luminescents, France
- Institute of Low Temperature and Structure, Poland
- Adam Mickiewicz University, Astronomical Observatory, Poland
- Université de Limoges, France
- Astri-Polska, Poland

## COORDINATOR

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## PROJECT INFORMATION

Small debris removal by laser illumination  
and complementary technology (CLEANSPACE)

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